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TITLE: Method and system minimizing drug to food interactions

Abstract Paragraph:

A method for monitoring an individual's drug regimen and meal regimen to reduce the likelihood of a drug-to-food interaction. An ingredient group table is constructed that includes ingredient groups which are known to cause an adverse reaction when combined with a particular drug in an individual. Known drugs are linked to contraindicated ingredient groups listed in the ingredient group table to create a drug-ingredient group table, which includes the known drugs and the linked contraindicated ingredient groups. The drug regimen of an individual is determined from a Physicians' Orders database. The drug-ingredient group table is searched using the individual's drug regimen as the search criteria. Matching drugs along with the linked contraindicated ingredient groups are extracted from the drug-ingredient group table and placed in a personalized drug-ingredient group table. A personalized contraindicated ingredient group table is created by extracting the contraindicated ingredient groups of the personalized drug-ingredient group table. Food items from an institutions menu are linked to the ingredient groups of the ingredient group table to create a food-ingredient group table, which includes the food items and the linked ingredient groups. The meal regimen of an individual is determined from dietary software or other means. The food-ingredient group table is searched using the individual's meal regimen as the search criteria. Matching food items along with the linked ingredient groups are extracted from the food-ingredient group table and placed in a personalized food-ingredient group table. The ingredient groups linked to each food item of the personalized food-ingredient group table are compared to the personalized contraindicated ingredient group table. If there are one or more matching ingredient groups between the two tables, a contraindication warning is issued. If there are no matching ingredient groups, then the meal may be served to the individual.

Summary of Invention Paragraph:

[0003] Various factors can decrease or eliminate a medication's effectiveness. As used herein, the terms medication, drug and the like mean the same. These factors include, for example, drug-to-drug interactions and drug-to-food interactions. A drug-to-drug interaction results when two or more drugs are taken together and one or more of the drugs are rendered less effective or ineffective by the presence of another drug or drugs in the patient's system. A drug-to-drug interaction also may cause one or more side effects or conditions, such as a rash, stomach ache, headache, etc. A drug-to-food interaction, on the other hand, results when a drug is taken in combination with a particular food or food group. An ingredient in the food or food group may render the drug less effective or ineffective. For example, a given drug, when taken in combination with a grapefruit, may be rendered less effective than intended or even ineffective.

Summary of Invention Paragraph:

[0008] Health care institutions, such as nursing homes, assisted living centers, hospitals, etc., provide care to individuals over a period of time ranging from several days or weeks, or even indefinitely. These institutions provide medical care, including medications, as well as every day needs, such as meals and beverages. In many cases the institution has its own kitchen which prepares menus and meals for the residents and serves them in a common dining area. The size of each institution varies and generally can range from less than 50 to more than 500 patients. The larger the institution and the more diverse its patients, the more diverse are the food requirements, menus, medications and, thus, the complexity of the operation and maintaining of care to meet the needs of the patients.

Summary of Invention Paragraph:

[0012] Briefly, according to an aspect of the present invention, a connection is made between a menu or meal regimen and Physicians' Orders in such a way as to reduce or to avoid drug-to-food interactions. By creating ingredient group tables, which are described in greater detail below, linking is provided between foods, dishes, purchased or prepared ingredients, raw ingredients, and the like, on the one hand, with drugs prescribed in Physicians' Orders, on the other hand, so as to reduce or to avoid drug-to-food interactions.

Summary of Invention Paragraph:

[0013] Another aspect of the invention relates to a method of reducing the likelihood of drug-to-food interactions, which includes the steps of comparing the ingredients in at least one of a food, food group, meal and snack intended for serving to an individual with contraindicated ingredients with respect to a drug regimen of the individual and providing an output representative of contraindications encountered.

Summary of Invention Paragraph:

[0014] Another aspect of the invention relates to a computer system for reducing the likelihood of drug-to-food interactions, which includes a processor, a computer program executed by the processor to cause the computer to compare the ingredients in at least one of a food, food group, meal and snack intended for serving to an individual with contraindicated ingredients with respect to a drug regimen of the individual and provide an output representative of contraindications encountered.

Brief Description of Drawings Paragraph:

[0017] FIG. 2A is an illustration showing the present invention providing relationship between dietary matters, e.g., menus/meal regimens, on the one hand, and Physicians' Orders, e.g., drugs, on the other hand, via a link provided using food-ingredient group relationships and drug-ingredient group relationships.

Brief Description of Drawings Paragraph:

[0019] FIG. 3 is a flow chart for determining the ingredient groups associated with each food in an individual's meal regimen in accordance with the present invention.

Brief Description of Drawings Paragraph:

[0020] FIG. 4 is a flow chart for determining contraindicated ingredient groups associated with each drug based on an individual's drug regimen in accordance with the present invention.

Brief Description of Drawings Paragraph:

[0021] FIG. 5 is a flow chart for determining if an ingredient group associated with each food in the individual's meal regimen is contraindicated by the individual's drug regimen in accordance with the present invention.

Brief Description of Drawings Paragraph:

[0022] FIG. 6A is an exemplary ingredient group table in accordance with the present invention.

Brief Description of Drawings Paragraph:

[0023] FIG. 6B is an exemplary ingredient group table which includes actual ingredient groups in accordance with the present invention.

Brief Description of Drawings Paragraph:

[0024] FIG. 7 is an exemplary food-ingredient group table in accordance with the present invention.

Brief Description of Drawings Paragraph:

[0025] FIG. 8 is an exemplary personalized food-ingredient group table in accordance with the present invention.

Brief Description of Drawings Paragraph:

[0027] FIG. 10 is an exemplary drug-ingredient group table in accordance with the present invention.

Brief Description of Drawings Paragraph:

[0028] FIG. 11 is an exemplary personalized drug-ingredient group table in accordance with the present invention.

Brief Description of Drawings Paragraph:

[0029] FIG. 12 is an exemplary personalized contraindicated ingredient group table in accordance with the present invention.

Detail Description Paragraph:

[0034] Briefly and as is described in detail below, the present invention provides an efficient method, apparatus and system for avoiding adverse drug-to-food interactions. An ingredient group table is prepared to identify conveniently a collection of ingredient groups that have an adverse drug-to-food interaction with one or more drugs, which may be taken by a patient. One non-limiting example of such an adverse drug-to-food interaction is the reducing of effectiveness of the drug and, thus, the increased time required for the drug to have its intended effect. The method, apparatus and system of the invention are able efficiently to compare food menus intended for respective patients or meal regimens of respective patients with the drug regimens of those respective patients and to use the ingredient group table in connection with the comparisons and the results of the comparisons, thereby leading to a determination of whether there is a contraindicated food intended for a respective patient. If there is such a contraindication, the food may be identified and, if appropriate, avoided, e.g., eliminated from the menu or food regimen for the given patient. A substitute food that is not contraindicated may be substituted.

Detail Description Paragraph:

[0035] A prior art method 1 for minimizing drug-to-food interactions is illustrated in FIG. 1. Beginning at step 2, each drug prescribed to a patient is written down, e.g., on a sheet of paper or entered in a table or database. The sheet, table or database is commonly referred to as the Physicians' Orders or Medical Records. The Physicians' Orders are personalized to the patient, e.g., due to the patient's needs, the physician orders or prescribes a drug or drugs. At step 3 a person checks an Information Sheet to determine whether there are any foods, food groups or ingredients that would cause an adverse drug-to-food reaction with each of the drugs in the Physicians' Orders for the given patient; these foods would be referred to as contraindicated foods. At step 4 the contraindicated foods, food groups or ingredients may be listed, if desired. At step 5 a person checks each food, food group or ingredient intended to be eaten or fed to a patient, e.g., consumed or ingested by the patient, for a given meal, snack, or the like, relative to the contraindicated foods to determine whether one or more of the foods should not be given to the patient. The person or persons who would make the above checks usually would be one or more employees of the institution, e.g., a nurse, a food server, a person in the dietary department, etc. While this method may be effective when the number of individuals in a "check group" is small, it quickly becomes inefficient as the check group increases in size and in a population whose individuals would be prescribed multiple drugs, as typically would be found in a health care institution. There is a further complicating factor to the checking mentioned just above. It is possible that the contraindication, e.g., the adverse drug-to-food interaction, may be on account of an ingredient in a food, a wholly prepared food that includes several ingredients, etc.

Detail Description Paragraph:

[0036] In the description below reference will be made to an "ingredient group". As used herein, ingredient groups are food related items that are listed in the drug literature as having an adverse reaction with a particular drug. An ingredient group may be an ingredient (sometimes referred to as a "raw ingredient"), such as, for example, wheat and caffeine. Note that the ingredient group also may be a food, such as a grapefruit, for example. The ingredient group may be a class of foods, e.g., game meat and shell fish. With the above in mind, then, it will be appreciated that an ingredient group includes things that are ingredients, whole foods, and groups of foods. Thus, an ingredient group can be a subset, equal to, or a super set of a food, as will be discussed in more detail below.

Detail Description Paragraph:

[0037] In the present invention for which an overview is illustrated schematically in FIG. 2A, the data of interest is the drug-to-food interaction information for each patient leading to determination of contraindication. According to the invention, information on contraindicated ingredient groups with respect to drugs is obtained and assembled, e.g., from drug information provided by drug manufacturers, to form an ingredient group table. Using the ingredient group table, a known drug regimen of a patient and a known meal regimen of a patient, a personalized drug-ingredient group table and a personalized food-ingredient group table are prepared, according to the present invention. As mentioned above, the ingredient group table of the present invention includes ingredient groups that can be a subset, equal to, or a super set of a food to which it is linked. Generally in software (when linking tables) there is a parent table and a child table, where the child table is a subset of the parent table. In the present invention, the child table, in addition to being subset of the parent table, can be equal to or a super set of the parent table. A unique feature of the present invention is that there is an ingredient group table without repeat entries, e.g., each ingredient group is listed once. All drugs and all contraindicated foods, food groups or ingredients are linked to the ingredient group table. The fact of table creation makes it proper to identify foods with links to drugs. In contrast, the prior art method lists food items, but the user must determine whether a food item is contraindicated, which may not be clear. For example, a user may be required to determine whether a particular meat is a "game meat". As will be appreciated from the description below, the invention provides in effect a linking between the above mentioned tables to determine which food items, if any, in a patient's meal regimen may cause a drug-to-food interaction.

Detail Description Paragraph:

[0039] Drug manufacturers provide drug information to the FDA as well as other service providers, such as First Data Bank (owned by Hearst Corporation) and Multum (owned by Cerner), who are commercial suppliers of drug information databases. The drug information concerns contraindicated foods, food groups and ingredients that, when ingested by an individual in combination with a particular drug, may cause an adverse reaction, e.g., reduce or eliminate the drug's effectiveness. Such drug information typically has been unorganized information within text files of information sheets. In the present invention, the drug information regarding the food, food groups and ingredients is compiled and placed in a table to form the ingredient group table, where each food, food group or ingredient is listed only once. Each drug is linked to a corresponding contraindicated ingredient group or groups (assuming the drug has a contraindicated ingredient group) to form the drug-ingredient group table. The ingredient group table and the drug-ingredient group table are described in more detail below with respect to FIG. 6A and FIG. 10 respectively.

Detail Description Paragraph:

[0040] From the drug-ingredient group table and the patient's drug regimen, a personalized drug ingredient group table is derived. The personalized drug-ingredient group table relates to ingredient groups that should not be consumed by a patient, e.g., the contraindicated ingredient groups. The personalized drug-ingredient group table includes ingredient groups that cause an adverse reaction with each drug in a patient's drug regimen. The elements of the personalized drug-ingredient group table are derived using the drug-ingredient group table and the patient's drug regimen, as determined from the Physicians' Orders. The drug-ingredient group table is "searched" using the patient's drug regimen as the search criteria. Any drug from the patient's drug regimen that is found in the drug-ingredient group table is extracted, along with the "linked" ingredient group, and placed in the personalized drug-ingredient group table. The contraindicated ingredient groups of the personalized drug-ingredient group table are extracted (duplicate ingredient groups are discarded) and placed in another table, which is referred to as the personalized contraindicated ingredient group table. Thus, the personalized contraindicated ingredient group table includes a listing of the ingredient groups that are contraindicated by the patient's drug regimen. The personalized drug-ingredient group table and the personalized contraindicated ingredient group table are described in more detail below with respect to FIG. 11 and FIG. 12.

Detail Description Paragraph: